2-1972

A Machine for Pasture Interseeding

Clarence E. Johnson
South Dakota State University

Edwin A. Dowding
South Dakota State University

Paul Wheldon

Circular 206

A Machine for Pasture Interseeding

Agricultural Engineering Department
Agricultural Experiment Station
South Dakota State University
Brookings

Figure 1. Interseeded pasture immediately after interseeding.

Figure 2. Interseeded pasture (same as in Figure 1) approximately 4 months after interseeding.

A Machine for Pasture Interseeding

By
Clarence E. Johnson, associate professor; Edwin A. Dowding, instructor; and Paul M. Wheeldon, draftsman, Agricultural Engineering Department.

Many low producing grasslands in South Dakota lack legumes and/or high producing grasses. Introduction of legumes, such as pasture-type alfalfas, provides additional forage and nitrogen production that improves grass growth. High producing grasses can be introduced to supplement existing grasses in a pasture.

A pasture's productivity, species of forage, topography, soil type, and other factors should be considered when selecting methods of pasture renovation. Much low producing grassland can be improved by interseeding. Interseeding permits establishment of new legumes and grasses in low producing grasslands without creating potential erosion hazards or eliminating all production capabilities during the period of establishment.

Machine Development

A pasture interseeding machine that interseeds legumes and grasses in established grasslands has been developed by the Agricultural Engineering Department of South Dakota State University. The pasture interseeding machine cuts four furrows approximately 4 inches wide, 2 inches deep and 30 inches apart. Seeds are placed in a seedbed prepared in these furrows. The furrows eliminate some competition from the existing sod and minimize runoff and erosion if placed on the contour.

SDSU agricultural engineers designed the machine so the spring-loaded coulters and inclined disks cut slices of sod and soil. These slices are displaced to the sides of the cut furrows. Seeds are planted with furrow openers operating in the cut furrows. The results of interseeding legumes and grasses in grassland during 1969, 1970 and 1971 were favorable when adequate moisture and weather conditions prevailed. Most furrows and sod slices produced while interseeding will weather (see Figures 1 and 2), thus, maintenance of the grassland will not be severely handicapped. Results show much promise of increasing production and quality of grasslands.

Approximately 900 acres of grassland were interseeded in southeastern South Dakota during the machine's development. Varied terrain, soil conditions and topography were encountered. Some interseeded areas were steep and rocky. From the first prototype to the final experimental machine, a number of modifications improved functional aspects and durability of the implement. The final machine consisted of spring-loaded coulters, inclined disks, double disk openers and seed metering devices mounted on a multiple toolbar frame (see Figure 4).

Machine Construction

The final machine was constructed from manufactured agricultural implement parts, drive train components, various steel angles and flats. Parts and material requirements are listed in Table 1. The parts are listed by item number. The locations of these parts on the constructed machine are identified by their item numbers in Figure 4 through Figure 14. The description of each part in Table 1 lists the figures in which that part is identified. Also, the description includes the manufacturer's part number and the name of the manufacturer.

Some parts were modified or fabricated especially for the machine. Views of these parts and procedures of modification and fabrication are shown in Figures 15 through 19.

References

For further information see:
"Interseeding for Pasture and Range Improvement," L. A. Derscheid, R. A. Moore and M. D. Rumbaugh, FS 422, Cooperative Extension Service, South Dakota State University, 1970.
"Pasture Interseeding," South Dakota *Farm & Home Research*, Vol. 22, No. 1, pp. 7-10, 1971.
"Development and Performance of a Pasture Interseeding Machine," C. E. Johnson, E. A. Dowding and P. K. Turnquist, South Dakota State University, Paper No. NC71-103 presented at the 1971 annual meeting of the North Central Region of ASAE at Winnipeg, Manitoba, Canada, 1971.

Table 1. Parts and Materials List

Item Number	Quantity Required	Description
1	1	Toolbar with 3 point hitch. Ford No. 13-190 2¼ x 2¼ x 144 in. See Figs. 4 and 13.
2	1	Toolbar (solid) 2¼ x 2¼ x 120 in. See Fig. 11.
3	2	Toolbar (hollow) 2¼ x 2¼ x 48 in. See Fig. 7.
4	10	Clamp facing (cast for 2¼ in. square toolbar). Fleischer Manufacturing, Inc., Manufacturers of the Buffalo Line, No. 3-4404. See Figs. 12 and 14.
5	8	Clamp facing (formed channel for 2¼ in. square toolbar). Special products Co. (Spee Co.) No. CF 1330. See Fig. 14.
6	3	Toolbar spacer (12½ in. spacing). Special Products Co. (Spee Co.) No. SP 13210. See Figs. 4 and 13.
7	2	Gauge wheel with 4 x 12 in. tire. International Harvester No. Kind 23 Code 1066. See Figs. 11 and 12.
8	2	Gauge wheel to toolbar clamp. Fleischer Manufacturing, Inc., Manufacturers of the Buffalo Line, No. 3-4400-5-321. See Fig. 12.
9	4	Spring loaded coulter with clamp. Case Power and Equipment No. T-87657. See Figs. 6 and 13.
10	4	Sod removal disk. Each unit consists of the following parts as manufactured by Allis Chalmers (See Fig. 6). See Fig. 16 for shank modifications.

Quantity per unit	Mfg. Part Number	Name
1	344830	Shank, short
2	344832	Cap, clamp
2	922970	Bolt
2	905347	Lockwasher
2	912616	Nut
1	344821	U-Bolt
2	910308	Nut
2	904209	Lockwasher
1	344824	Disk (18 in.)
1	344823	Bolt assembly
1	900412	Nut
1	344820	Bearing assembly
1	344826	Housing, bearing
2	340912	Spool, bearing
1	330072	Washer, gang bolt
3	333489	Washer, spring

Item Number	Quantity Required	Description
11	4	Double disk furrow opener. John Deere No. BB 96060. See Figs. 6 and 7.
12	2	Legume seed hopper (1 hopper with 2 meters). Dakon-Noble No. 201-5-25. See Figs. 5 and 14.
13	2	Hopper mounting post (vertical, 18 in.) Dakon-Noble No. 40611. See Fig. 14.
14	2	Grass seed hopper (2 rows per hopper, double auger meter) Insul-Wool Machine Co., 121 N. Dodge, Wichita, Kansas. See Fig. 4.
15	1	Drive wheel (6.00 x 16 tire, 30 tooth, ASA No. 50 roller chain sprocket). Fleischer Manufacturing, Inc., Manufacturers of the Buffalo Line, No. K-4301. See Fig. 8.
16	1	44 tooth, ⅝ in. pitch, ASA No. 50 roller chain sprocket, 1 in. bore, type B hub, ¼ x ⅛ in. keyway. See Figs. 8 and 10.
17	1	12 tooth, ⅝ in. pitch, ASA No. 50 roller chain sprocket, 1 in. bore type B hub, ¼ x ⅛ in. keyway. See Figs. 8 and 10.
18	1	30 tooth, ⅝ in. pitch, ASA No. 50 roller chain sprocket, ¾ in. bore type B hub, 3/16 x 3/32 in. keyway. See Figs. 8 and 10.
19	1	17 tooth, ⅝ in. pitch, ASA No. 50 roller chain ball bearing idler sprocket, ½ in. bore. See Figs. 8 and 10.
20	2	14 tooth, ½ in. pitch, ASA No. 40 roller chain sprocket, ¾ in. bore type B hub, 3/16 x 3/32 in. keyway. See Fig. 9.
21	2	14 tooth, ½ in. pitch, ASA No. 40 roller chain sprocket, ½ in. bore type B hub, ⅛ x 1/16 in. keyway. See Fig. 9.
22	2	14 tooth, ½ in. pitch, ASA No. 40 roller chain ball bearing idler sprocket, ½ in. bore. See Fig. 9.
23	1	20 tooth, No. 32 detachable link chain sprocket, ¾ in. bore. See Figs. 5 and 9.
24	1	10 tooth, No. 32 detachable link chain sprocket, ¾ in. bore (spare sprocket for grass seeding rate change).
25	1	9 tooth, No. 32 detachable link chain sprocket, ¾ in. bore. See Figs. 5 and 9.
26	1	8 tooth, No. 32 detachable link chain sprocket, ¾ in. bore. See Fig. 9.
27	1	7 tooth, No. 32 detachable link chain sprocket, ¾ in. bore. See Fig. 5.
28	1	11 ft. of ⅝ in. pitch, ASA No. 50 roller chain. See Fig. 8.
29	1	3 ft. of ⅝ in. pitch, ASA No. 50 roller chain. See Fig. 10.
30	2	4 ft. ½ in. pitch, ASA No. 50, roller chain. See Fig. 14.
31	1	4 ft. of No. 32 detachable link chain. See Figs 5 and 9.
32	3	¾ in. bore, low base series, self-aligning, sealed ball bearing pillow block. See Fig. 10.

Item Number	Quantity Required	Description
33	2	1 in. bore, low base series, self-aligning, sealed ball bearing pillow block. See Fig. 10.
34	1	$\frac{3}{4}$ in. bore, rigid bronze bearing pillow block. See Fig. 9.
35	1	$\frac{3}{4}$ in. diameter shaft, 8 ft. long. See Fig. 10.
36	1	$\frac{3}{4}$ in. diameter shaft, 6 in. long. See Fig. 9.
37	1	1 in. diameter shaft, 1 ft. long. See Fig. 10.
38	1	Mounting bracket for seed hoppers. See Figs. 4 and 15.
39	4	Furrow opener pivot mount. See Figs. 7 and 17.
40	4	Coulter bracket (short). (Two are used for hopper mount support). See Figs. 5, 11, 12, 13, and 17.
41	2	Coulter bracket (long). See Figs. 5, 11, and 17.
42	4	Adjustable toolbar spacer. See Figs. 6, 14, and 18.
43	1	Hopper mount brace. See Figs. 5 and 19.
44	1	Spring loaded idler. See Figs. 5, 9, and 19.
45	2	$2\frac{1}{2} \times 2\frac{1}{2} \times \frac{1}{4} \times 6$ in. angle iron. Drill to fit bearing (item No. 33) and fix to toolbar spacer (item No. 6) as shown in Fig. 8.
Iron	4 ft.	$\frac{1}{4}$ x 2 in. strap iron.
	2 ft.	3/16 x $1\frac{1}{8}$ in. strap iron.
	10 ft.	$\frac{1}{4}$ x 5 in. strap iron.
	3 ft.	1 x 1 x 3/16 in. angle iron.
	17 ft.	$1\frac{1}{2}$ x $1\frac{1}{2}$ x 3/16 in. angle iron.
	$3\frac{1}{2}$ ft.	2 x 2 x $\frac{1}{4}$ in. angle iron.
	1 ft.	$2\frac{1}{2} \times 2\frac{1}{2}$ x $\frac{1}{4}$ in. angle iron.
	$2\frac{1}{2}$ ft.	$\frac{5}{8}$ x $2\frac{1}{2}$ in. bar.
	4 ft.	$\frac{3}{4}$ x 4 in. bar.
	$4\frac{1}{2}$ ft.	$1\frac{1}{4}$ x $3\frac{1}{4}$ in. bar.
	$2\frac{1}{2}$ ft.	$\frac{3}{4}$ in. diameter cold rolled shaft.
	3 ft.	$\frac{5}{8}$ in. diameter round bar.
	4 ft.	$1\frac{1}{4}$ in. diameter cold rolled shaft.
	2 ft.	2 in. O. D. x $1\frac{1}{4}$ in I. D. tube.
Bolts	8	5/16 x $1\frac{1}{2}$ in. NC.
	14	$\frac{3}{8}$ x $1\frac{1}{2}$ in. NC.
	8	$\frac{3}{8}$ x 3 in. NC.
	8	$\frac{1}{2}$ x 2 in. NC.
	12	$\frac{1}{2}$ x $2\frac{1}{2}$ in. NC.
	4	$\frac{5}{8}$ x $2\frac{1}{2}$ in. NC.
	20	$\frac{3}{4}$ x $5\frac{1}{2}$ in. NC. ($2\frac{1}{2}$ in. thread).
	16	$\frac{3}{4}$ x 9 in. NC. ($2\frac{1}{2}$ in. thread).
Washers	8	5/16 in. lock washer.
	20	$\frac{3}{8}$ in. flat washer.
	14	$\frac{3}{8}$ in. lock washer.
	20	$\frac{1}{2}$ in. lock washer.
	4	$\frac{5}{8}$ in. lock washer.
	16	$\frac{3}{4}$ in. flat washer.
	4	$1\frac{1}{4}$ in. flat washer.
	36	$\frac{3}{4}$ in. lock washer.
Nuts	8	5/16 in. NC.
	22	$\frac{3}{8}$ in. NC.
	20	$\frac{1}{2}$ in. NC.
	4	$\frac{5}{8}$ in. NC.
	36	$\frac{3}{4}$ in. NC.
Misc.	2	$\frac{3}{4}$ in. bore flexible couplers.
	8	1 in. hose clamps.
	4	$1\frac{1}{2}$ in. hose clamps.
	4	Roll pins—2 x 3/16 in.
	16 ft.	$\frac{5}{8}$ in. I. D. plastic hose.
	16 ft.	1 in. I. D. plastic hose.
	12 ft.	$\frac{1}{4}$ in. log chain.

No endorsement of specific products or equipment named is intended, nor is criticism implied of those not mentioned.

Figure 3. Small plants begin to show in new furrow.

Figures 4, 5, 6, 7, 8, and 9.

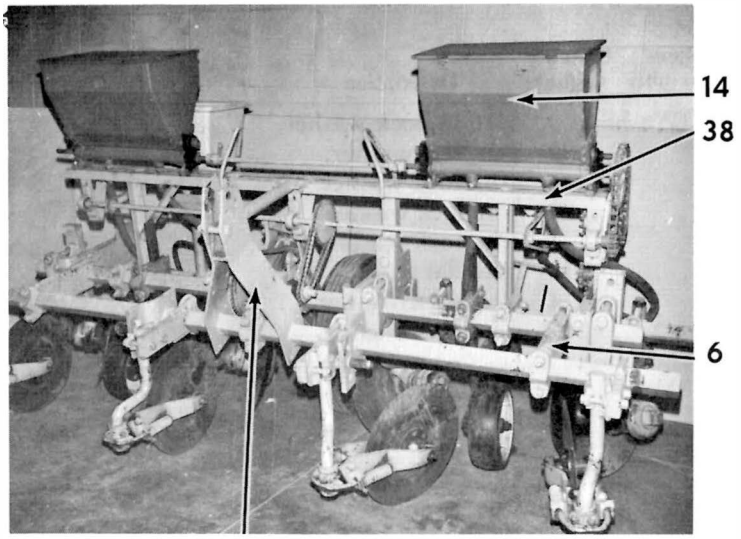


Fig. 4

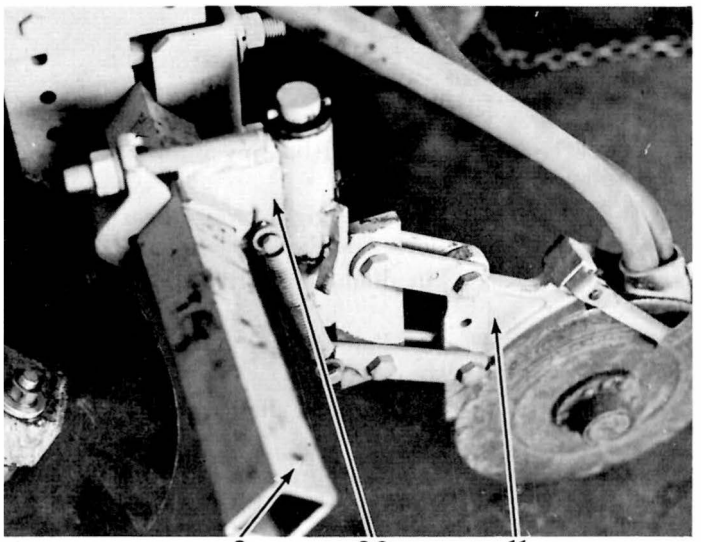


Fig. 7

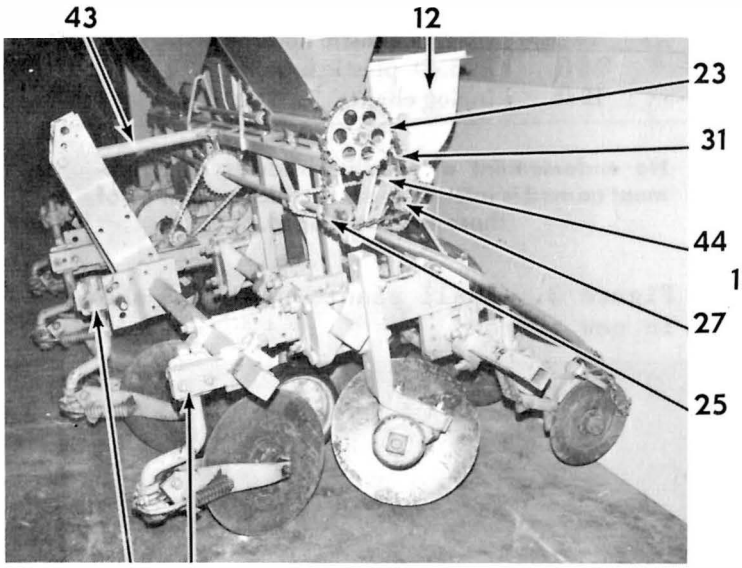


Fig. 5

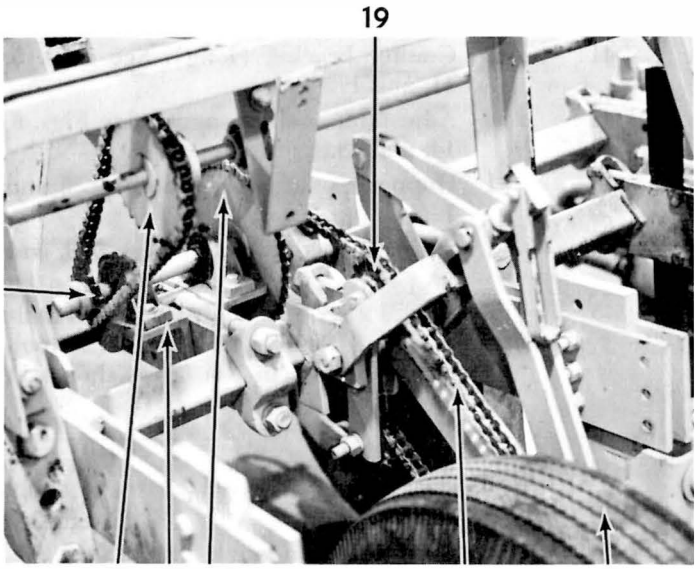


Fig. 8

Fig. 6

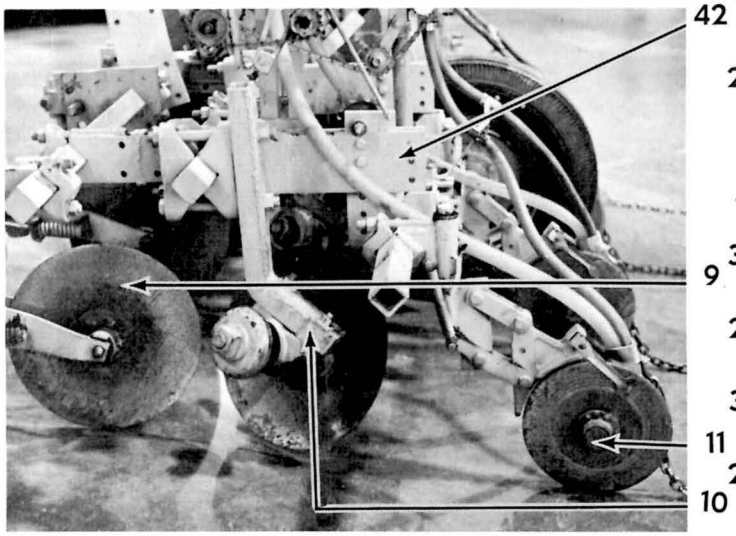
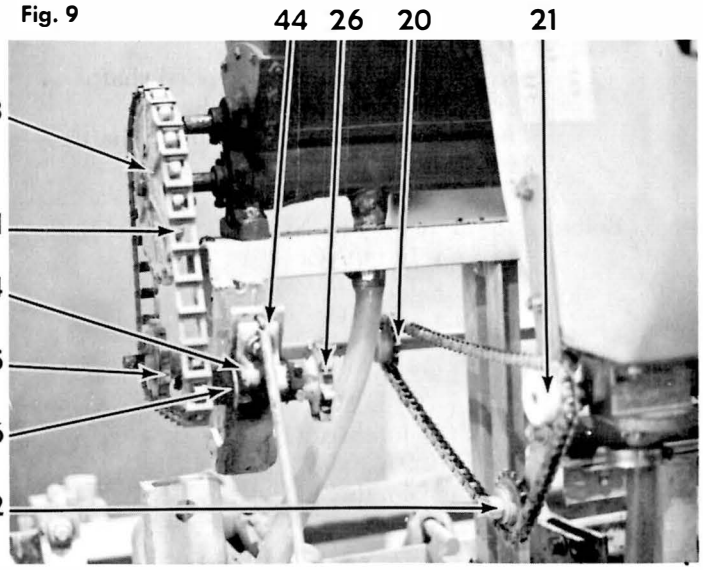


Fig. 9



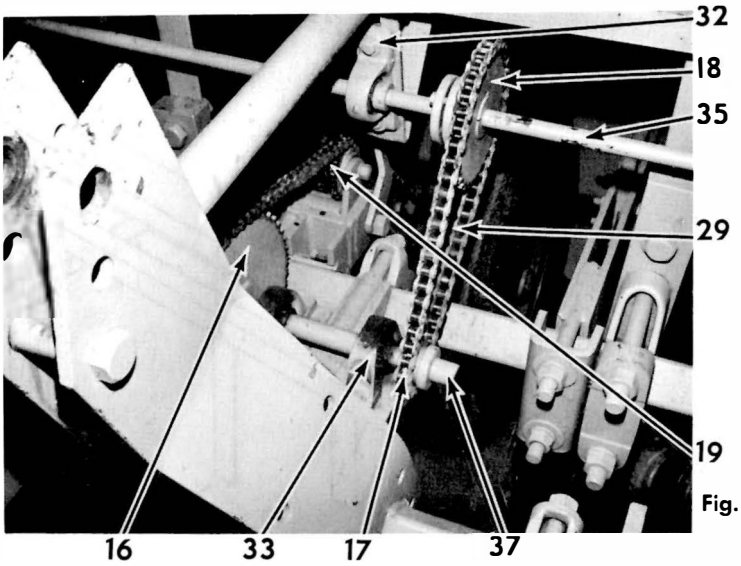


Fig. 10

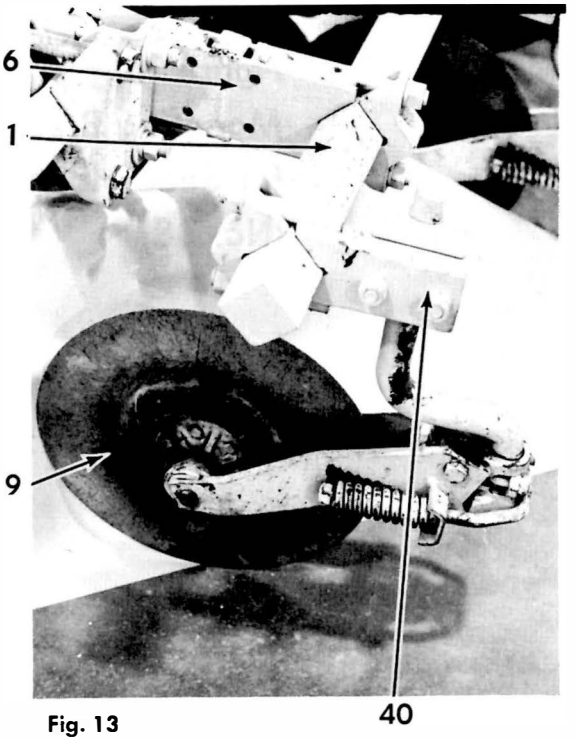


Fig. 13

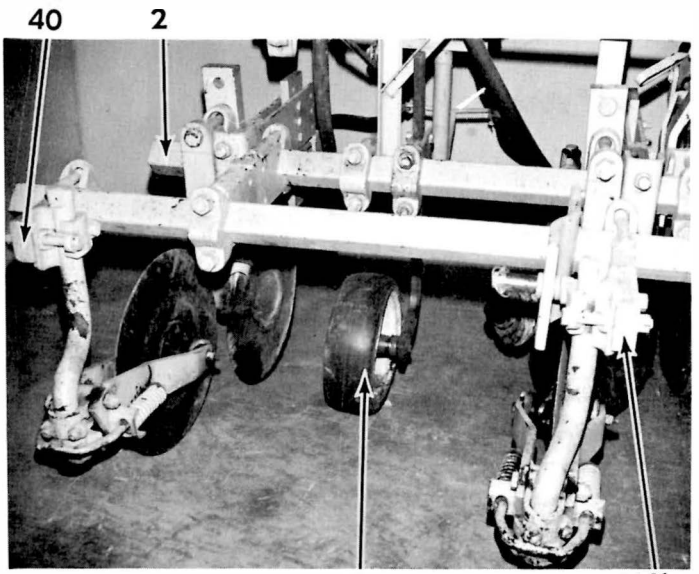


Fig. 11

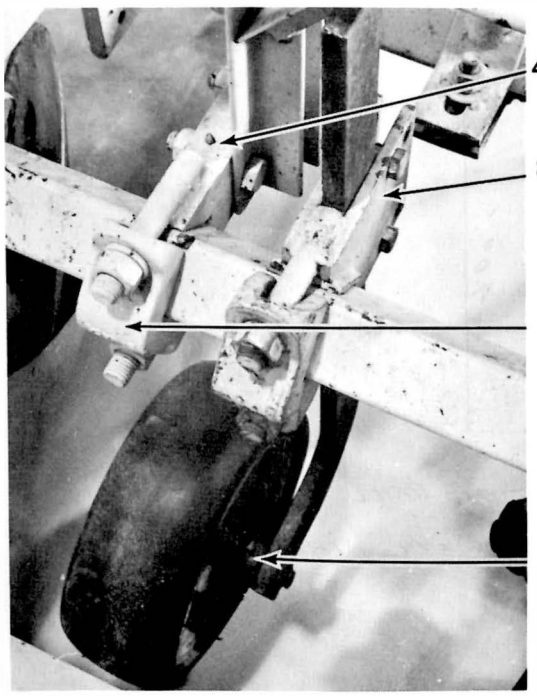


Fig. 12

Fig. 14

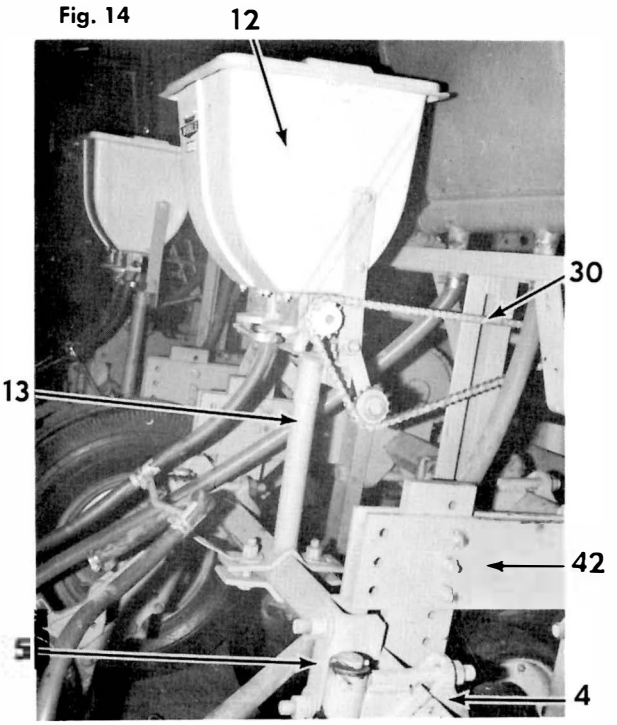


Figure 15
Mounting Bracket for Seed Hoppers (No. 38)

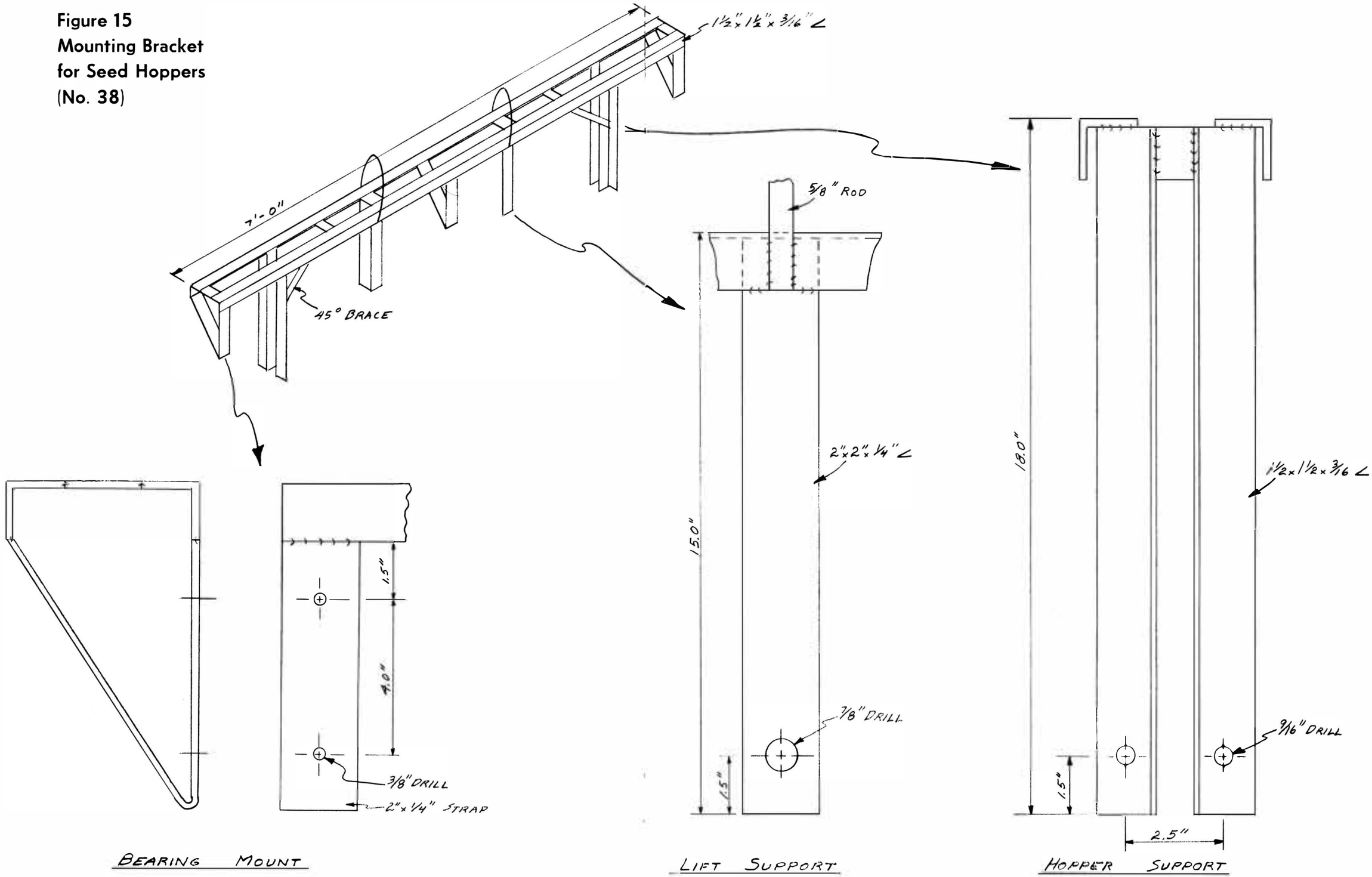
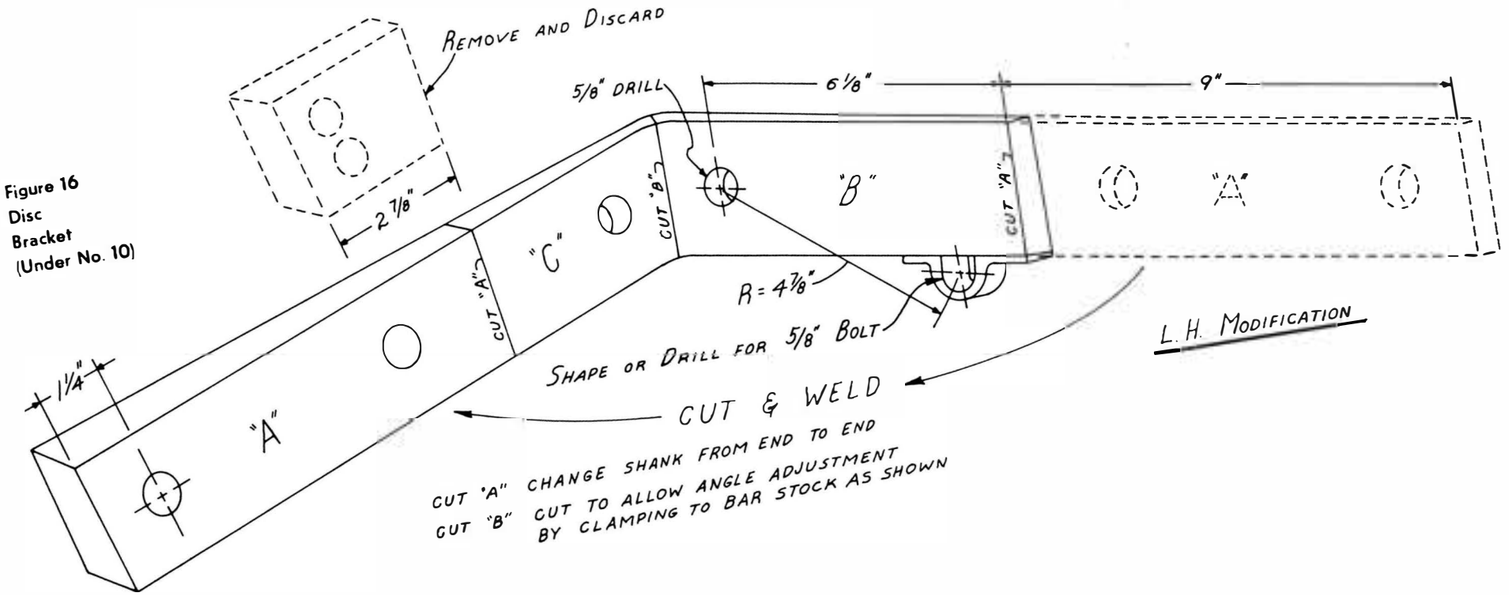
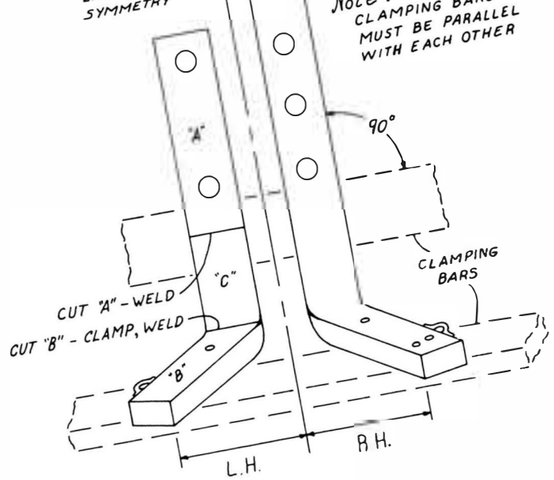
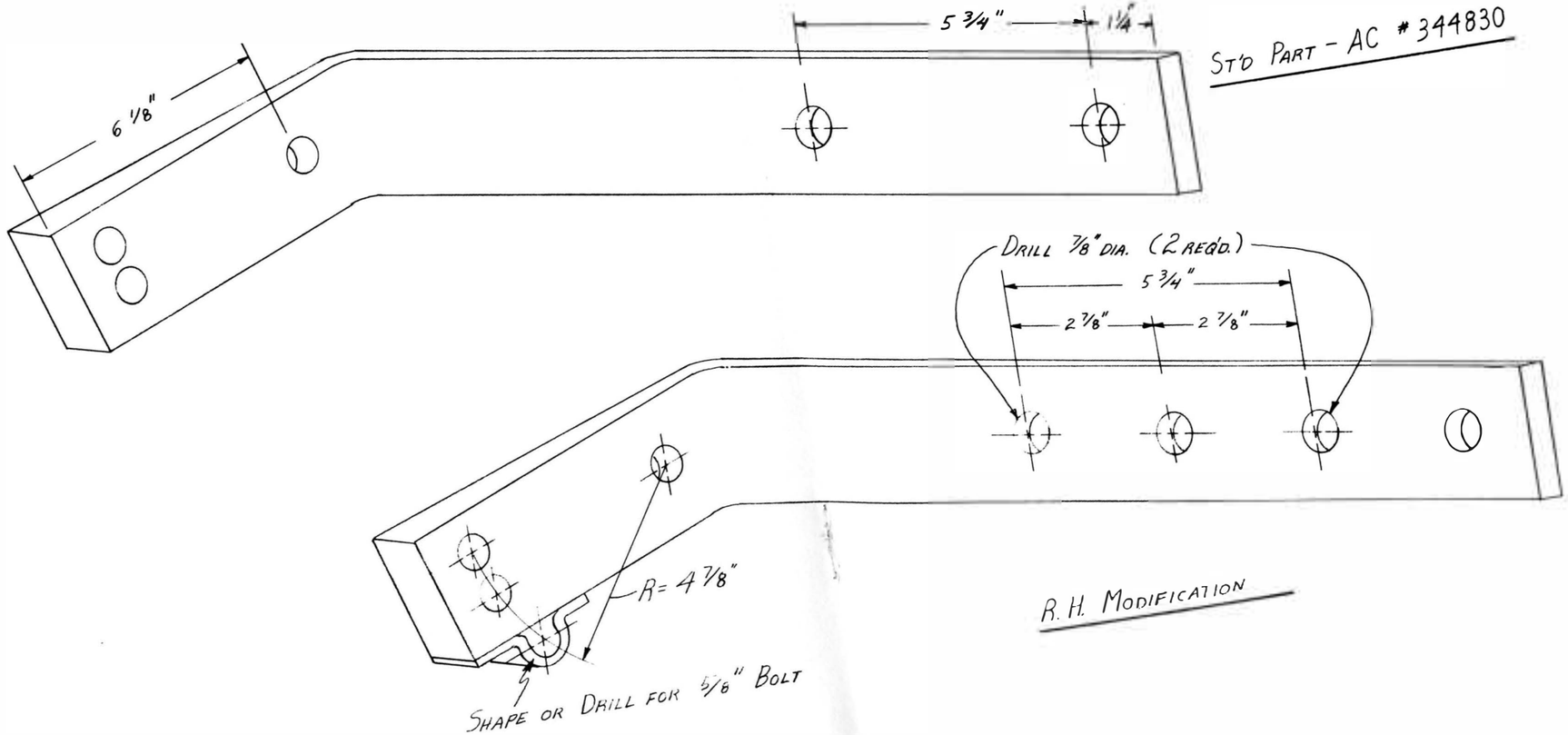


Figure 16
Disc
Bracket
(Under No. 10)







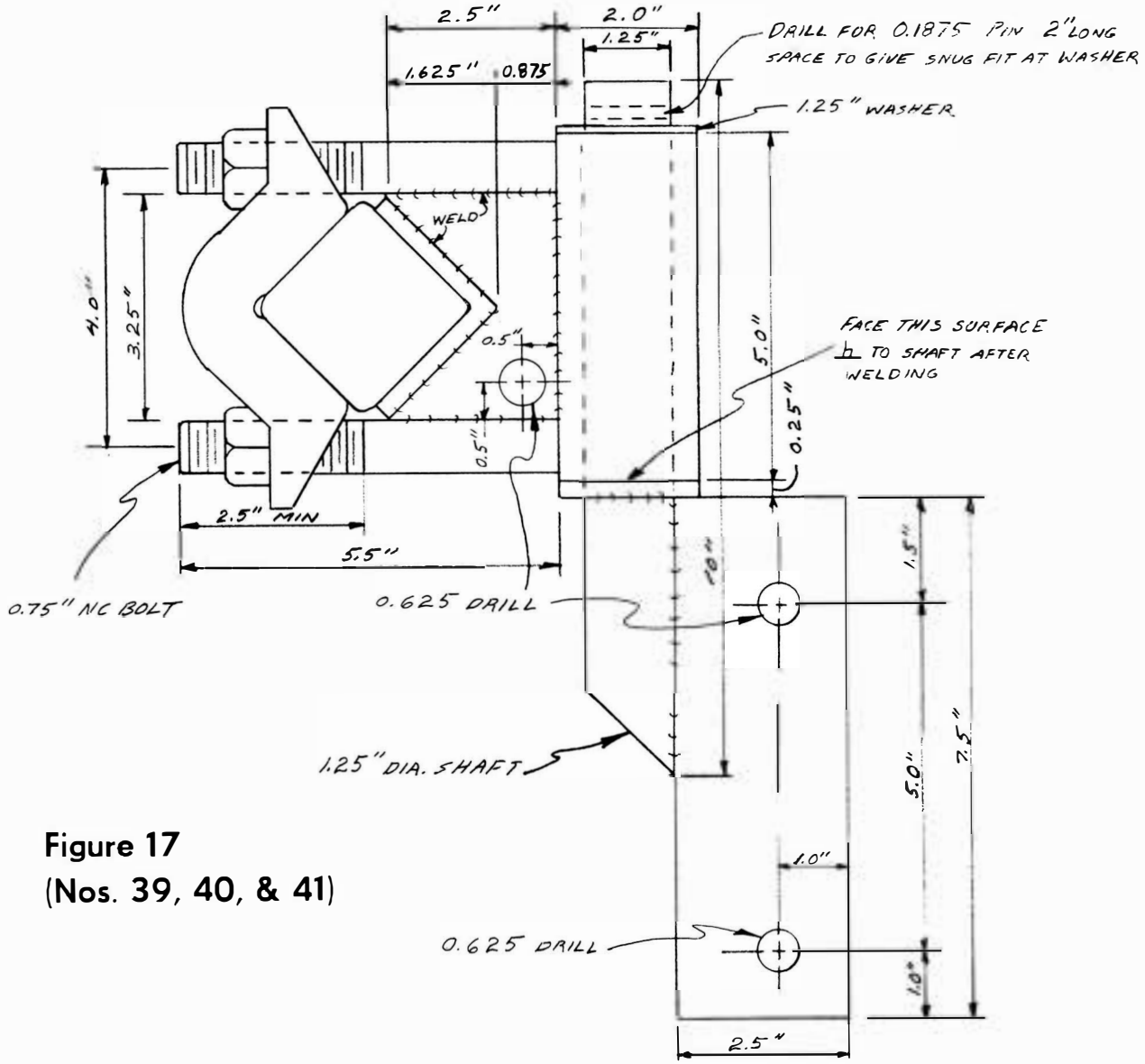
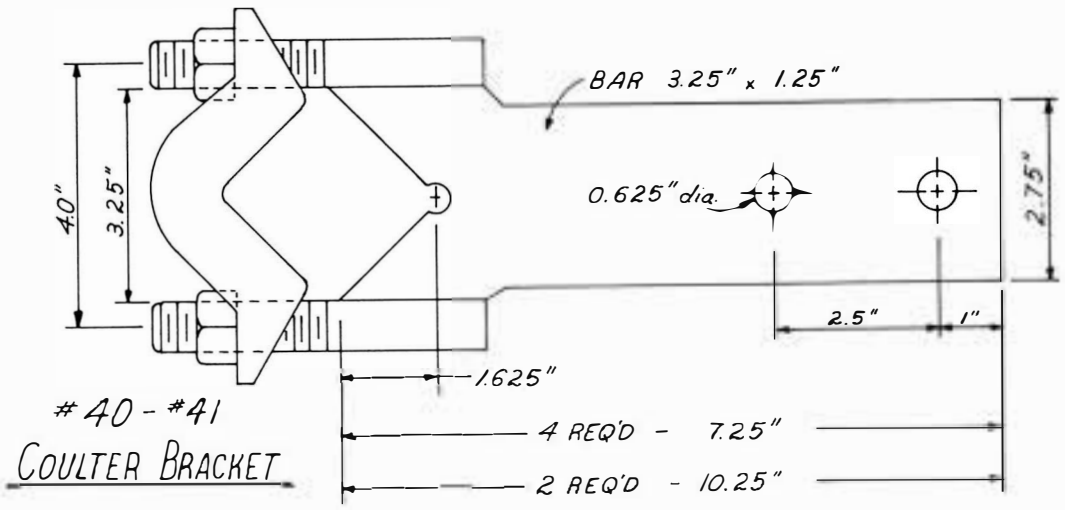
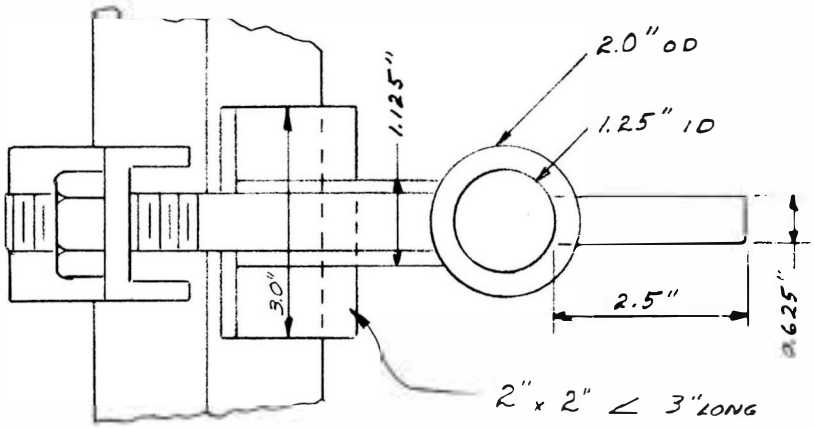


Figure 17
(Nos. 39, 40, & 41)

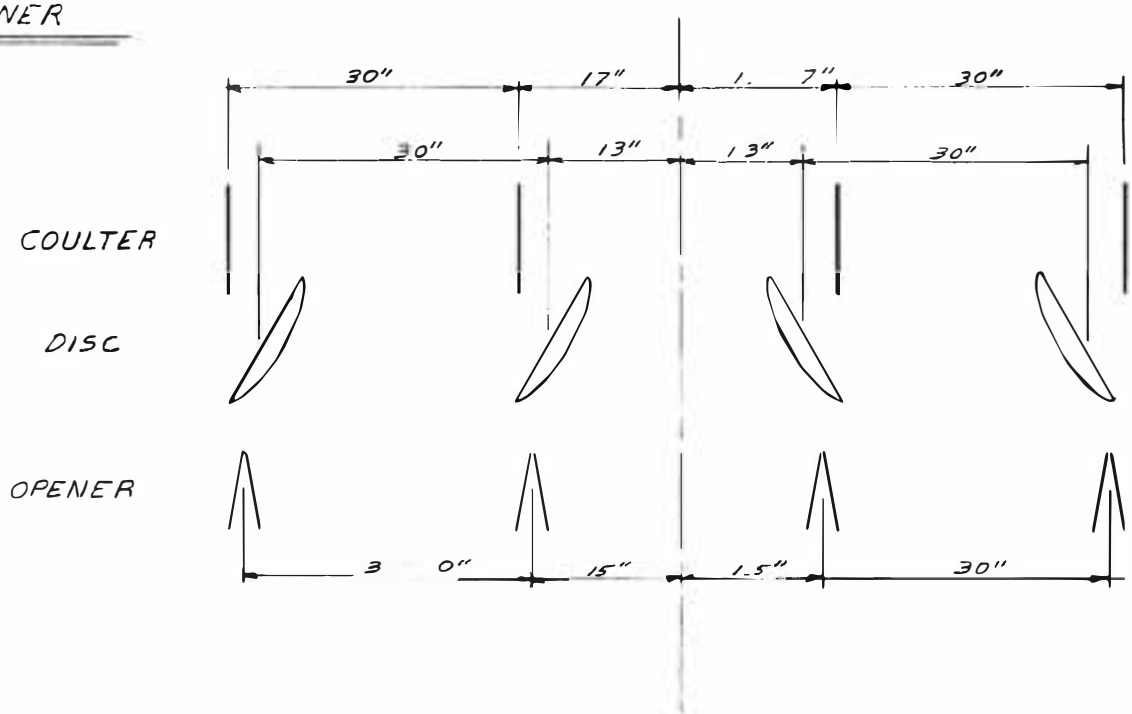


#40 - #41
COULTER BRACKET



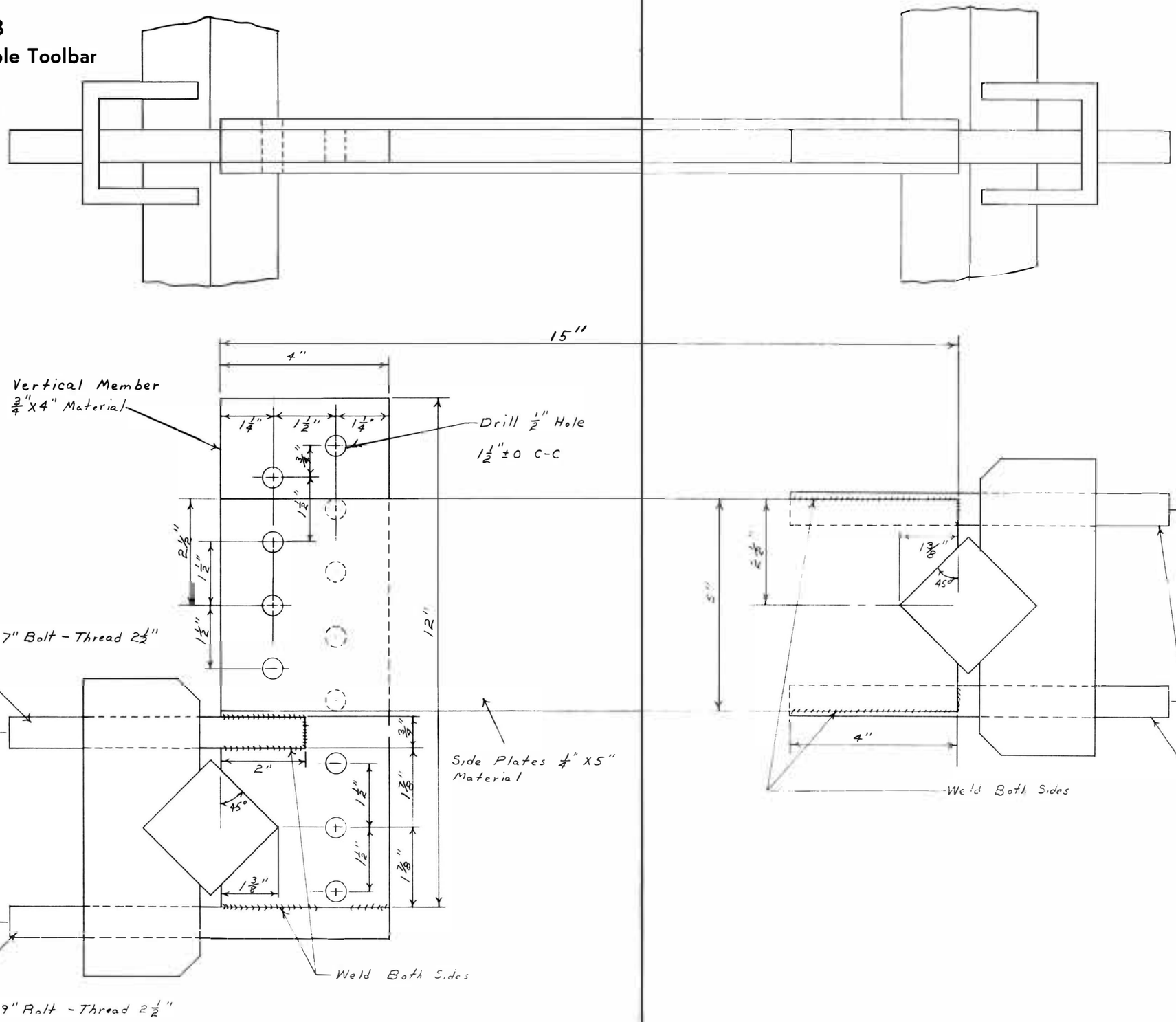
#39

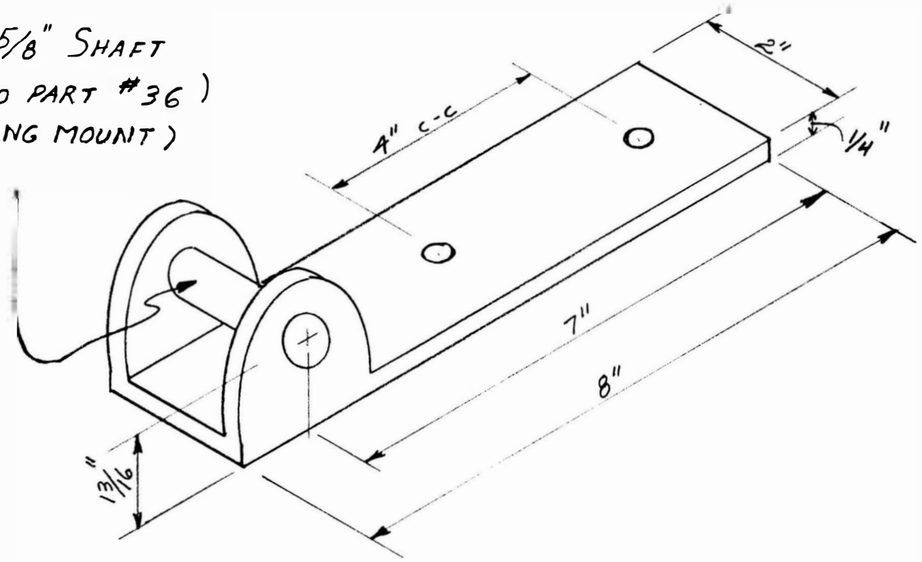
PIVOT MOUNT FOR FURROW OPENER



COMPONENT LOCATION

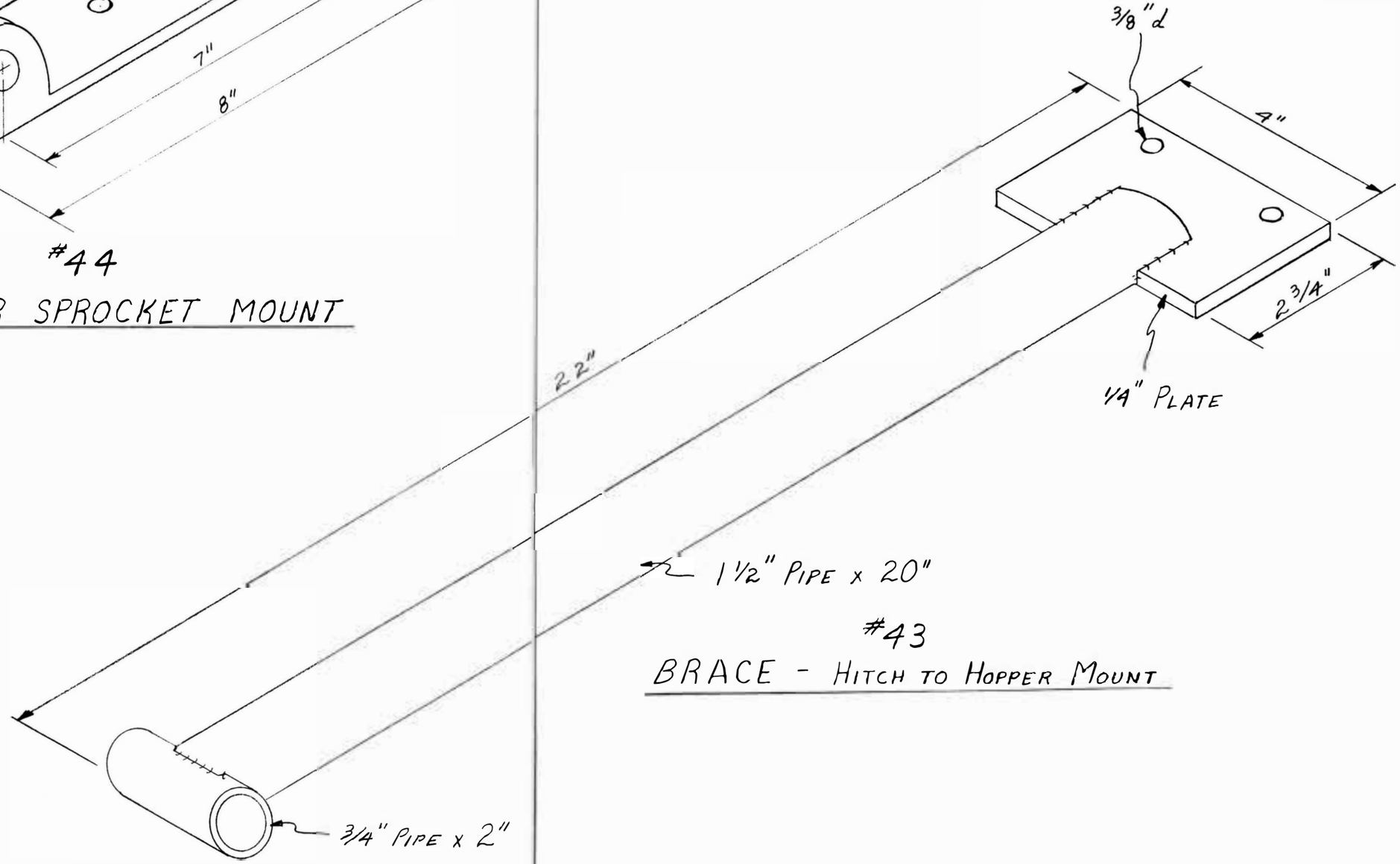
Figure 18
Adjustable Toolbar Spacer (No. 42)





#44

IDLER SPROCKET MOUNT



#43

BRACE - HITCH TO HOPPER MOUNT

Figure 19

Idler Sprocket Mount. Brace—Hitch to Hopper Mount. (Nos. 43 and 44)

File: 1.4-8.2—1,000 reprinted at estimated 53 cents each—4-80mb—6077A.